R-381R

# OFFICE MEMORANDUM

MICHIGAN
STATE HIGHWAY DEPARTMENT
JOHN C. MACKIE, COMMISSIONER



April 11, 1963

To: E. A. Finney, Director
Research Laboratory Division

From: C. C. Rhodes

Subject: Evaluation of Armor Speed Finish and Gun-Tex as Protective Coatings for Concrete Structures. Research Projects R-58 B-45, R-59 NM-10. Report No. R-381 R.

On September 15, 1958, at the request of P. A. Nordgren, R. L. Greenman authorized a study of "Armor Speed Finish," a product of DeClerk Industries, Inc., of Centerline, Mich., as a protective coating for concrete structures. At about the same time, another material intended for the same purpose, "Gun-Tex," made by Structure Coatings, Inc., of Los Angeles, Calif., was submitted by the producer's representative, J. Ralph Griffith, of Birmingham, Mich. Testing of the latter product was authorized by W. W. McLaughlin in December 1958. Samples of both materials were sent to the Research Laboratory Division, but no laboratory tests were made pending results of an experimental field application of Armor Speed Finish made in April 1959, by DeClerk employees on a regulator house at Outer Drive and Edsel Ford Expressway (eastern intersection) in Detroit, designated as E04 of 82025 UN (formerly E9 of 82-22-10).

At your suggestion the subject of both coatings was brought before the Committee for the Investigation of New Materials at its meeting on October 6, 1959. At this meeting, J. F. Oravec reported that the Bridge Construction Division was well satisfied with the appearance and durability of the treatment up to that time and that the total cost of the application was about 19 cents per sq ft. The Research Laboratory Division was requested to inspect the Detroit application at appropriate intervals, with the understanding that no further tests of either product, Armor Speed Finish or Gun-Tex, would be made until this field application should have been evaluated.

When Mr. Griffith (Gun-Tex) was informed of this decision, he pointed out that Gun-Tex was an entirely different kind of material than Armor Speed Finish and asked the Department to inspect various Gun-Tex applications in the Detroit area. Inspections of the Gun-Tex applications were made on March 1, 1962. The Laboratory later learned of an experimental application of Armor Speed Finish on the Belle Isle bridge, applied for the City of Detroit by DeClerk personnel, and this project was inspected on April 9, 1962. Inspection of the regulator house coated with Armor Speed Finish was carried out on November 6, 1962, together with inspection of a regulator house constructed about the same time, but hand rubbed, at the intersection of Cadieux Ave. and Edsel Ford Expressway, designated as E05 of 82025 UN (formerly E10 of 82-22-10). Observations from the three inspection trips are reported below by B. W. Pocock.

Armor Speed Finish

According to the manufacturer, Armor Speed Finish "is not a paint or waterproofing compound. It is a cement product having essentially the same thermal characteristics of expansion and contraction as the mortar in a well designed concrete mix." The manufacturer's directions state that it should be applied in two coats--a bonding coat and a finish coat. It is supposed to be mixed with water to a mortar consistency and "floated" on with a cork float. According to Paul H. Daavettila, Project Engineer, who was present when the work was done, the material was applied by personnel of DeClerk Industries according to directions, i.e., two coats put on with a cork float.

Inspection of the two regulator houses on November 6, 1962, disclosed some crack formation in both structures, as shown in Figs. 1 through 6. Since the cracks occurred in approximately the same places and were quite comparable in the two buildings, their formation undoubtedly bore no relationship to the different surface treatments. However, the marked difference in the appearance of the structures, which is clearly visible in the photographs, is the mottled aspect of the regulator house treated with Armor Speed Finish compared with the one which was hand rubbed. The texture of the rubbed finish seemed more uniform and was better in appearance than the spotty and unprepossessing texture of the test building. At the age of three years the durability of both structural surfaces appeared to be satisfactory.

Inspection of the Armor Speed Finish experimental coating on the Belle Isle bridge, on April 9, included two application areas both located in the first bay at the south or island end of the bridge (Fig. 7). One of these (Fig. 8) was a two-coat demonstration area which appeared to have been put on quite recently. The other area (Fig. 9), on an arch in the same bay as the first area, was said by the manufacturer to have been applied in June 1959. Although this arch may have been coated as stated, its appearance was very similar to that of the other arches in this bay. Even those at the bridge sides appeared to be in just as good condition as the arch coated with Armor Speed Finish. Thus, there was no clear evidence that the coating had caused any improvement in the condition of the concrete.

Gun-Tex

Information furnished by the Gun-Tex representative, Mr. Griffith, indicates that Gun-Tex is available in three grades, SC-101, SC-10, and 000-SMOOTH. SC-101 is coarse-textured, SC-10 medium-textured, and 000-SMOOTH smooth-textured. All applications inspected were 000-SMOOTH. This is said to be higher than the other grades in polyester-synthetic elastomer resin content, containing only asbestos and mica flakes as aggregates. Company literature states that "selected rubber agents provide the body for thick-film application."

Gun-Tex is a true coating, the recommended application rate being 50 sq ft per gal. Dry film thickness is about 30 mils. It can be sprayed, rolled, or brushed. All three methods of application were included among the sites inspected, with the age of the coating ranging from 7 to 32 months. Figs. 10 through 14 show their appearance on March 1, 1962.

Three additional Gun-Tex application sites inspected, but not illustrated here, included the Palmer Osteopathic Hospital at 18160 Woodward Ave. This was a roller application, applied on May 22, 1961, at 50 sq ft per gal. Where the underlying structure had cracked to 1/16 in. or more the Gun-Tex had also opened up, but no cracks less than 1/16 in. were visible.

Another site was at the Scott Paper Co., 9125 W. Jefferson. This is a brick office building, on which Gun-Tex 000-SMOOTH red had been sprayed during the summer of 1960 at 60 sq ft per gal, with no Dri-Cone or other sealer or surface preparation whatever. The general appearance was satisfactory, with a few poor areas. Mr. Griffith pointed out that the underlying brick was of a soft, porous nature. The Gun-Tex was scaling off the end of a ventilator made of galvanized steel, but he stated that at that spot the coating had not been applied according to directions.

A third site was a supermarket at Seven Mile and Evergreen. Here Gun-Tex 000-SMOOTH yellow had been rolled on in May 1961, at 50 sq ft per gal over soft brick. The Gun-Tex was seen to be in poor condition locally over a steel door, and on the surface of a chimney several feet above ground. Mr. Griffith explained the few poor spots as due to improper coverage or improper application, with improper preparation of the surface prior to coating.

## Concluding Remarks

The regulator house treated with Armor Speed Finish has a mottled and unprepossessing appearance. After three years the durability of the concrete, while satisfactory, appeared no better than that of a similar hand rubbed structure. DeClerk Industries informed the Laboratory on April 4, 1962, that the application had been improper--that the first coat had been allowed to dry out too much before application of the second. Applications on the Belle Isle bridge show no advantage whatever from the treatment.

The survey of Gun-Tex treated structures was inconclusive. Inasmuch as this material is of an entirely different nature (that is, organic vehicle rather than cement base), it may be worth investigating further.

I suggest that both of these coatings again be brought before the Committee for the Investigation of New Materials to clarify the purpose of the use of these materials and determine the course of future action.

OFFICE OF TESTING AND RESEARCH

C. C. Rhodes

C. C. Rhodes, Assistant Director
Research Laboratory Division

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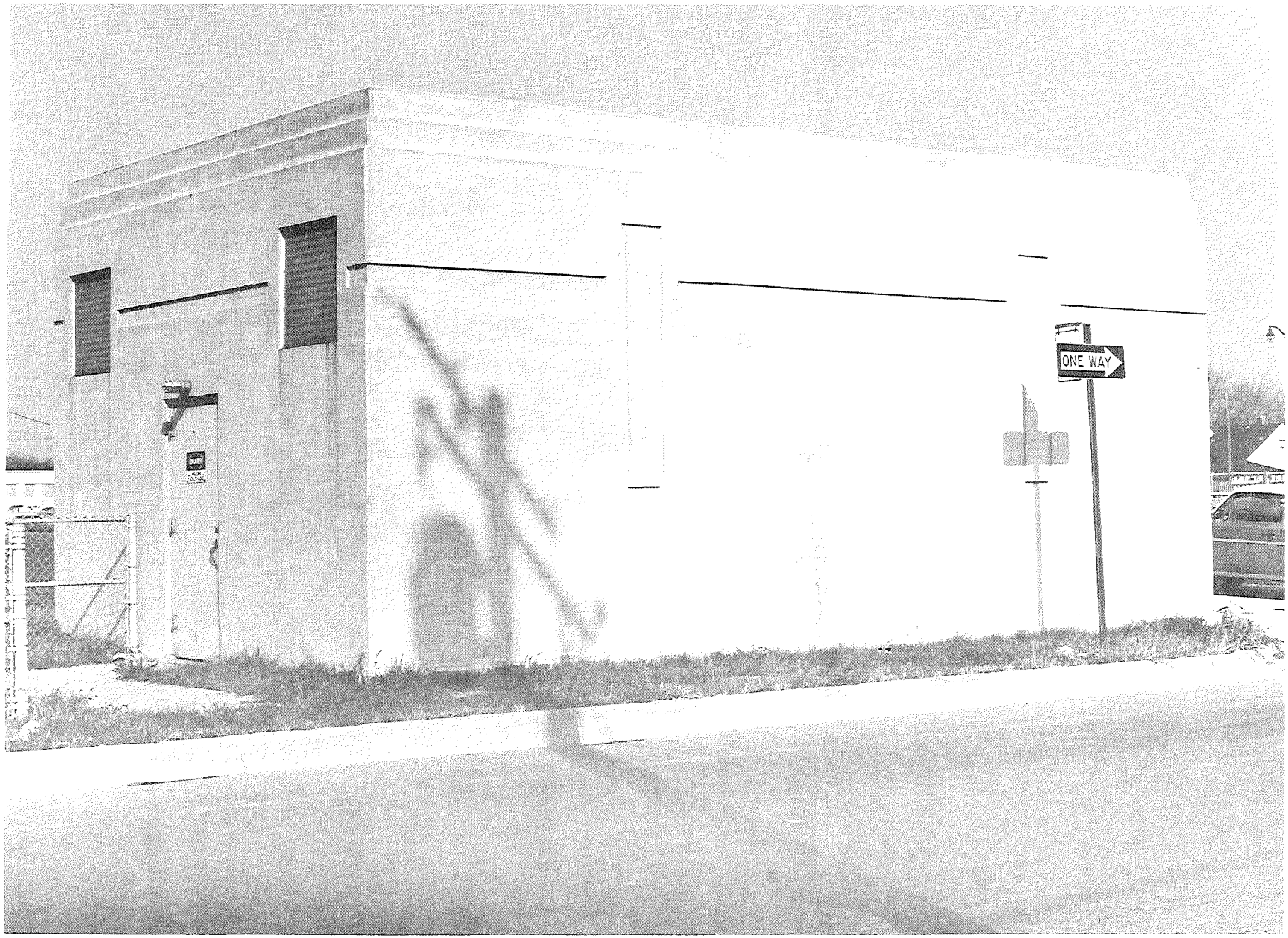


Figure 1. Regulator house with surface finished by hand rubbing, at the Edsel Ford Expressway and Cadieux Ave., Detroit (photo: 11-6-62).


Figure 2. Regulator house finished with Armor Speed Finish, at the Edsel Ford Expressway and Outer Drive, Detroit (photo: 11-6-62).

Figure 3. Hand-rubbed finish on Cadieux Ave. regulator house (photo: 11-6-62).

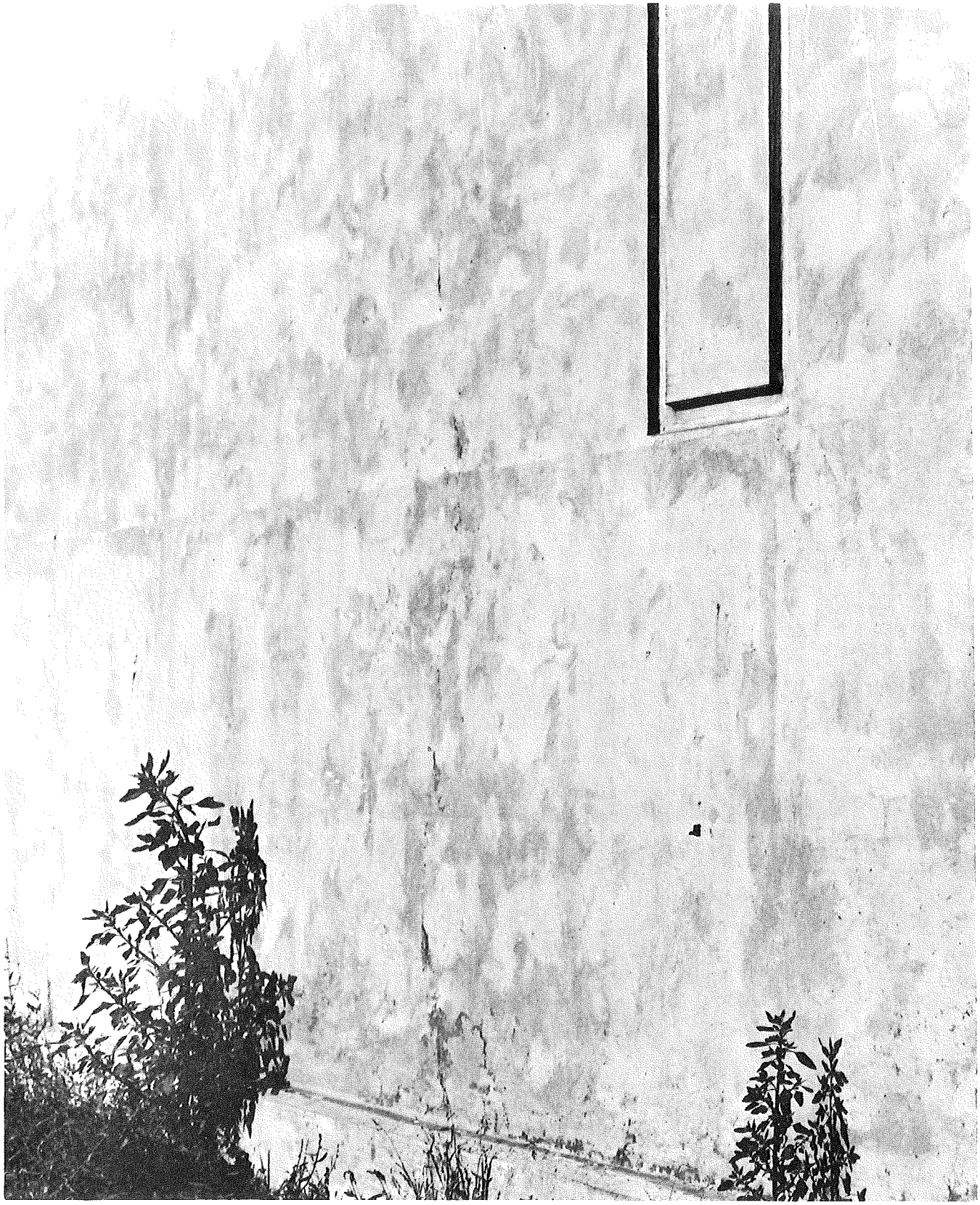

Figure 4. Armor Speed Finish on Outer Drive regulator house (photo: 11-6-62).

Figure 5. Hand-rubbed finish with typical crack on Cadieux Ave. regulator house (photo: 11-6-62).

Figure 6. Armor Speed Finish with typical crack on Outer Drive regulator house (photo: 11-6-62).

Figure 7. Belle Isle bridge viewed from the island (looking north). Bay on extreme right, which is adjacent to the south abutment, is site of two applications of Armor Speed Finish (photo: 4-9-62).

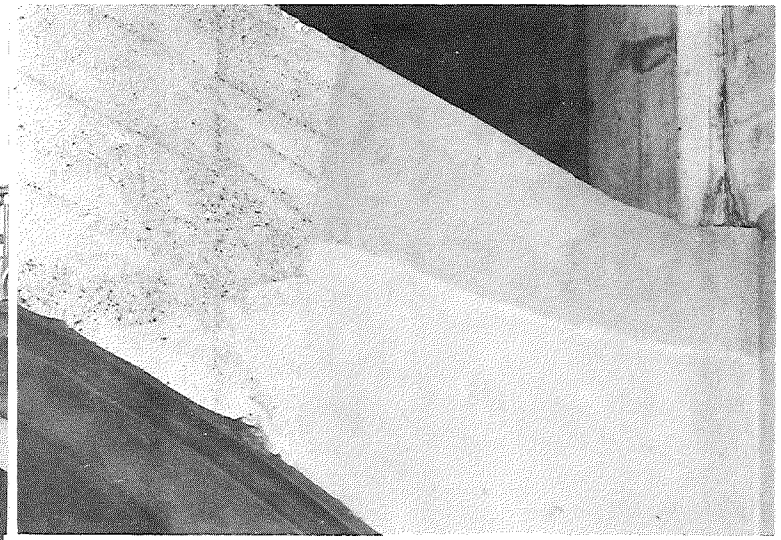

Figure 8. Demonstration application of Armor Speed Finish in two coats (bond coat above, seal coat below) on outer surface of west arch of first bay of Belle Isle bridge, adjacent to south abutment (photo: 4-9-62).

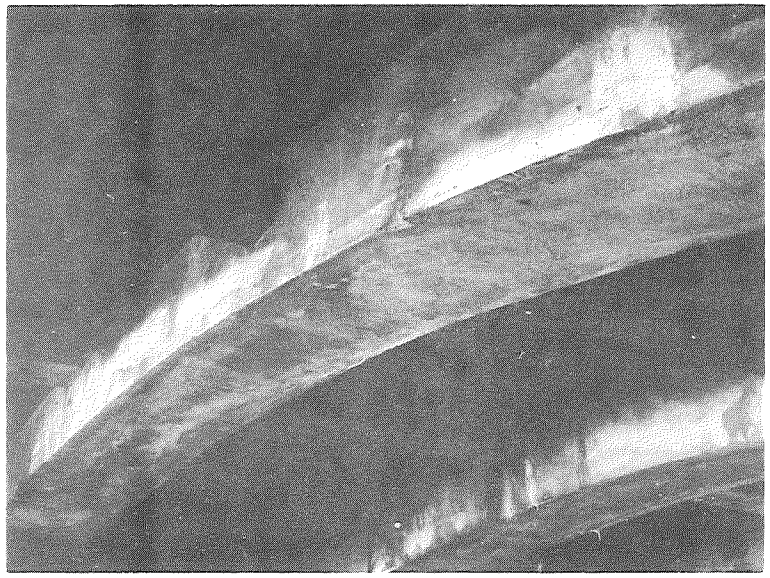

Figure 9. Arch coated with Armor Speed Finish in June 1959, near center of south bay of Belle Isle bridge (photo: 4-9-62).

Figure 10. Scuffed area at John K. Orlich funeral home, 17950 Woodward Ave., Detroit. Gun-Tex 000-SMOOTH, white, was applied by spray on June 29, 1960, over badly checked stucco, in one coat at 50 sq ft per gal. Scuffed area shows how material will take this kind of treatment without breaking bond, and indicates depth of coating (photo: 3-1-62).

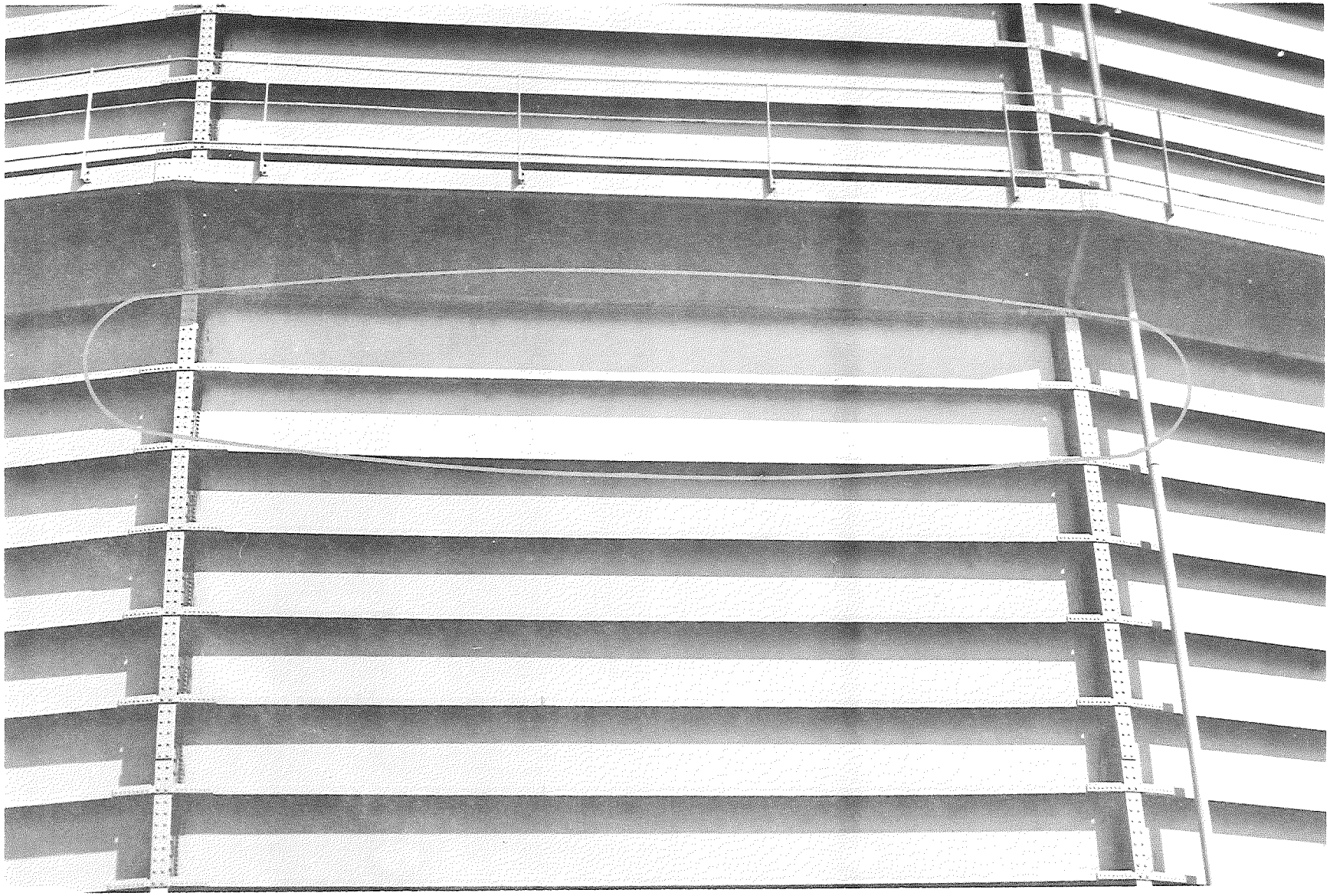

Figure 11. Storage tank of Michigan Consolidated Gas Co. on Lynch Rd. at Detroit City Airport. Two lighter panels (center) were brush coated with Gun-Tex 000-SMOOTH on November 20, 1959, with ambient temperature being below 40 F at time of application. Panels are steel and were sandblasted before coating at 50 sq ft per gal. Coating was in excellent condition at the time of this inspection (photo: 3-1-62).

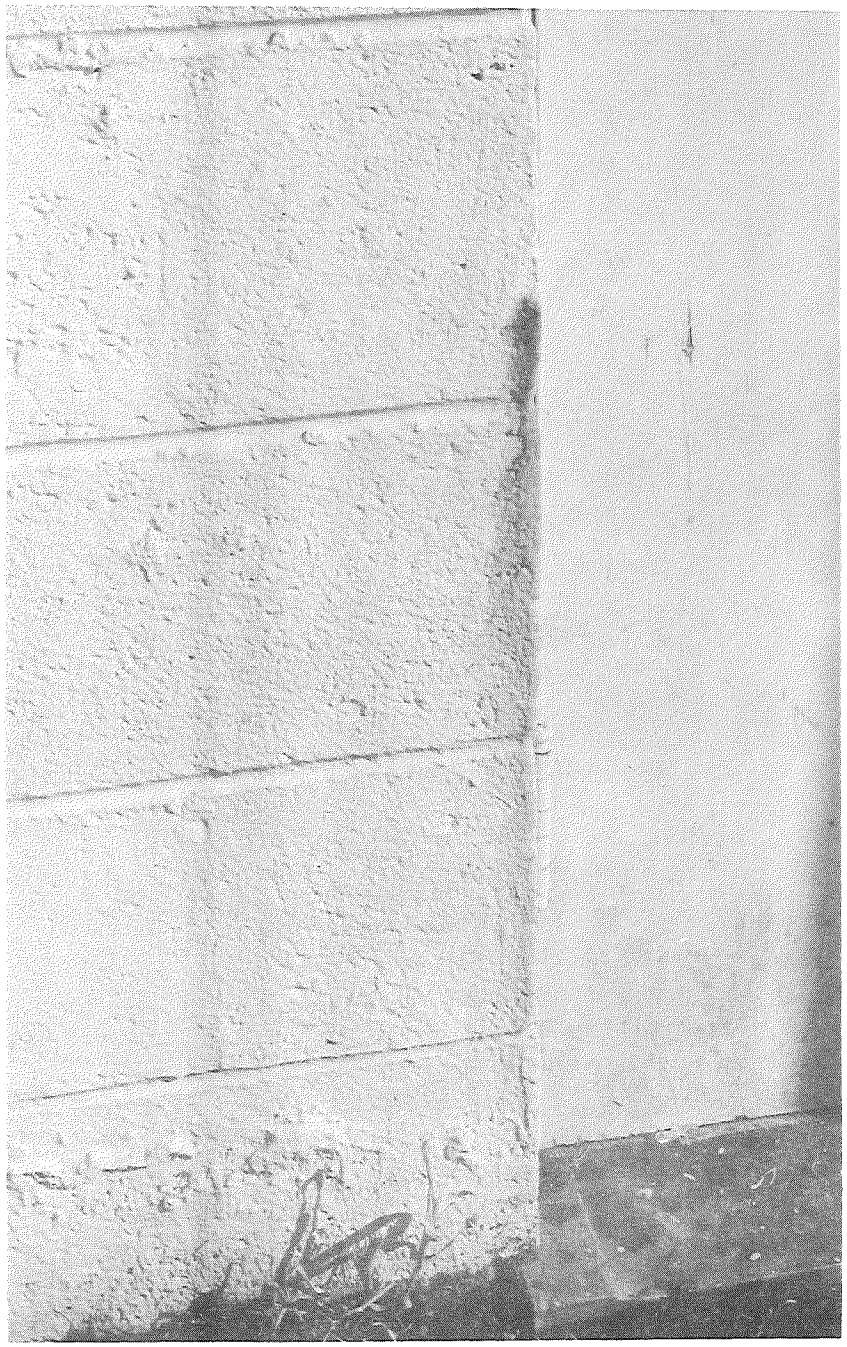

Figure 12. First Baptist Church at 9-1/2 Mile Rd and Coolidge Rd, Oak Park, a cement block structure brush-coated with Gun-Tex 000-SMOOTH in a single coat by members of the congregation in September 1960 at the rate of 50 sq ft per gal. Applicators were unskilled and some were 14-year-old children. General appearance good after two winters. Brown spot bleeding through coating on rear wall was explained by manufacturer's representative as due to insufficient coverage by amateur painters (photos: 3-1-62).

Figure 13. International Salt Co. mine, Detroit. Concrete ramp spray-coated with Gun-Tex 000-SMOOTH in summer of 1961, the old coating having been removed by sandblasting before Gun-Tex application. Concrete pillars supporting ramp have been in contact with salt during entire winter season without apparent effect (photos: 3-1-62).

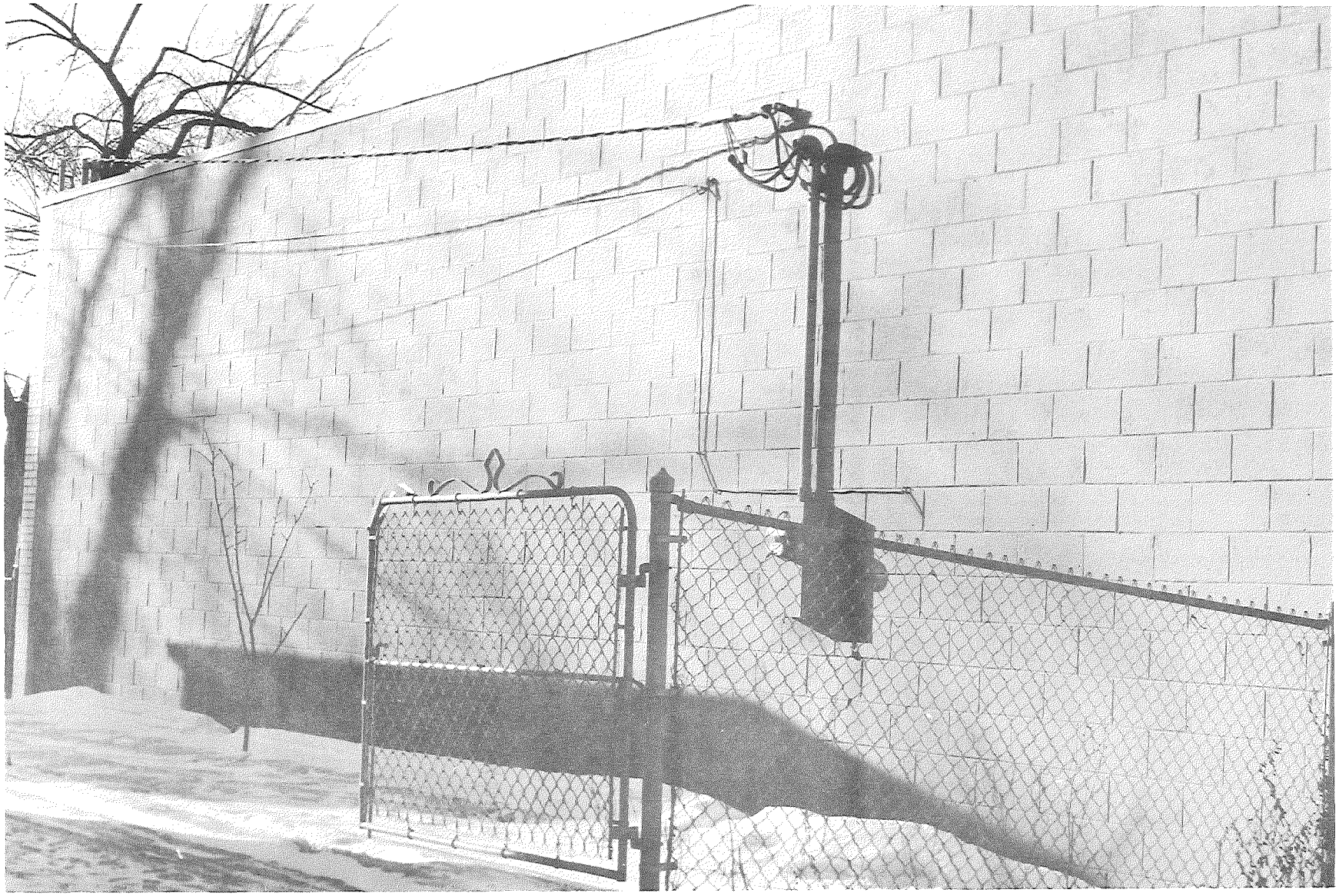

Figure 14. Speedway Corp. service station at Esper and Wyoming, Detroit. Rear wall of new cement block was coated with Gun-Tex 000-SMOOTH in August 1958. One coat of Dri-Cone #1260 was applied at 300 sq ft per gal on mortar joints to arrest lime burning; then Gun-Tex was brushed on immediately in two coats at 60 sq ft per gal total coverage (both coats). In excellent condition at time of inspection (photo: 3-1-62).